limits, only one member of the higher and heterocysted Cyanophyceæ has been noted, viz., *Hapalosiphon laminosus*. This species does not reach the upper temperature limits, even for the chlorophyllose forms. The majority of the chlorophyllose forms are either species of *Phormidium* or unicellular forms peculiar, as far as known at present, to the thermal waters. The chlorophylless forms, as far as detected, are filamentous, very slender, and belong to the group known as the sulphur bacteria. All of these forms are very closely related, even the so-called sulphur bacteria being little else than colorless species of *Phormidium*. A matter to be emphasized is this—that all of the strictly thermal organisms are low forms, not even representing the higher differentiation in the group to which they belong.

The question is always raised, in the case of the thermal organisms, as to the nature of the protoplasmic contents of the cells. What is it that enables the protoplasm of the thermal organisms to withstand a temperature which coagulates, and consequently kills, the protoplasm of the majority of organisms. We find that when a proteid, like egg albumen, is free from water, it does not coagulate at the very highest temperatures which leave it unburned, and that the less the content of water, the higher the temperature of coagulation. The cell structure in the Schizophyta is peculiar, being quite different from that of other groups of organisms. While the details are not satisfactorily settled, there seems to be a certainty that there is less differentiation than in other groups. Whether we believe that the protoplast is all nucleus or whether we believe that it is all cytoplasm, it remains clear that it is different from the protoplast of other groups of organisms and affords us room for surmise. There is nothing, so far as my own study of the Cyanophyceæ cell is concerned, to indicate that the protoplasm contains so little water as to render it incoagulable by the higher temperatures which it endures. It seems rather that there may be some important difference in the essential proteids of the mixture, or in the nature of the constitution of the substance, if it be regarded as simple, which renders it less coagulable, a difference similar to that existing between a substance of the group of the vitellins and one of the group of the globulins.

WILLIAM ALBERT SETCHELL.

SCIENTIFIC BOOKS.

THE SUGAR INDUSTRY.

Anleitung zur Untersuchung der für die Zuckerindustrie in Betracht kommenden Rohmaterialien, Produkte, Nebenprodukte und Hilfssubstanzen. Sechste umgearbeitete und vermehrte Auflage. Von R. FRÜHLING. Braunschweig, Friedrich Vieweg und Sohn. 1903. Pp. xxi + 505. Marks 12.00.

The rapid advances made in sugar chemistry within the past few years have necessitated a thorough revision of and the introduction of a considerable amount of new matter in this, the sixth, edition of Frühling's 'Anleitung.'

Examination of the book shows that the author has spared no pains to do justice to his self-imposed task.

Adoption of the regulations of the International Commission for Uniform Methods of Sugar Analysis, Paris, July 24, 1900, has of course resulted in the introduction of fundamental changes. The metric cubic centimeter has replaced the Mohr cubic centimeter; the normal sugar weight is now 26,000 grams instead of 26,048 grams; 20° Centigrade has been accepted as the standard temperature for the preparation and the polarization of sugar solutions. Space is given to the extensive table showing the relation between the specific gravity of sucrose solutions at 20° C. and the sucrose percentage of such

solutions, which table has been prepared by the Imperial *Normaleichungskommission*. Attention has also been paid to the determination of the alkalinity of first products, to the determination of sucrose in the presence of invert-sugar, raffinose, etc.

About one half of the book is given over to sugar-analysis, or rather, to be more precise, to the analysis of sugar and sugar-containing compounds. The rest of the work treats of the analysis of bone-black, water, limestone, gas-analysis, fuels, fertilizers and so on, and in most of these sections considerable changes and improvements are also to be noted.

A recalculation of all numerical data and problems was made imperative by adoption of 16 as the atomic weight of oxygen.

Paper and print are excellent, and the numerous illustrations a feature of value.

F. G. Wiechmann.

Societies and Academies.

The American Physical Society.

The spring meeting of the Physical Society was held at Columbia University, New York City, on Saturday, April 25. An unusually large program of fifteen papers was presented, and the attendance was above the average.

The first article was by H. T. Barnes and E. G. Coker, and dealt with the 'Flow of Water through Pipes in Stream Line Motion with Special Reference to the Critical Velocity.' By taking every precaution to have absolutely quiet water in the tank which supplied the pipe studied, it was found possible to increase the critical velocity much beyond the limit found by previous observers. The presence of little disturbances in the water entering the pipe seems to have a strong tendency to break up stream line flow into an irregular eddy flow. For small pipes the authors found that two critical velocities might be observed. As the velocity was increased from a low value a speed was reached at which stream line flow ceased and eddies formed. If the velocity was increased still more, another critical stage was reached, beyond which the flow again occurred in stream lines.

Messrs. H. T. Barnes and D. McIntosh described a form of platinum thermometer especially designed for work with the continuous flow calorimeter and avoiding many of the difficulties met with in previous forms.

In a paper on 'Architectural Acoustics' G. W. Stewart described a series of experiments made in the auditorium of Sibley College at Cornell University. The reverberation in this hall when first completed was so bad that a speaker could hardly be understood at all. It seemed to offer a good opportunity to test the methods and conclusions developed by Sabine in his work on architectural acoustics. Mr. Stewart found a complete agreement between the results obtained by experiment and those computed upon the basis of Sabine's theory.

A paper on the 'Spectral Energy Curve of a Black Body at Room Temperatures' was also presented by Mr. Stewart. In order to obtain radiation from a body at room temperature the vane of a radiometer was used as a radiating surface, while in front of the slit of the mirror spectrometer used was placed a body at the temperature of liquid air. Under these circumstances, since the radiation from so cold a body is practically nil, the cooling of the radiometer would be due to its own radiation, and the deflections observed in the different parts of the spectrum would measure the radiation for particular wave-lengths. The curve showing the distribution of energy in the spectrum had the same general form as that observed at higher temperatures. The maximum occurred at $9.2\,\mu$, the position of the maximum differing from that computed by Wien's formula by about $0.6\,\mu$. The energy curve was compared with that computed from Planck's theory, and variations of ten per cent. were noticed, although the curves were alike in general form. In view of the fact that the maximum deflection obtained was not quite 4 mm., such differences were not surprising.

The results of determinations of the specific heats of certain organic solids were presented by W. F. Magie. Fourteen substances were examined, the Pfaundler calorimeter being employed. The results were compared with